

CLAIMS

1. A reticle substrate comprising a pair of main surfaces opposing each other, two pairs of side faces that are right to the main surfaces and that are opposed in pair to each other, and chamfered surfaces between the main surfaces and the side faces, wherein:

a flatness is not greater than 0.5 μm on a flatness measurement area of each main surface, from which an area of 3mm laid inwardly from a boundary between the main surface and the chamfered surface is excluded, while the boundary between the main surface and the chamfered surface has a maximum height between -1 and 0 μm from a reference surface.

2. A mask blank comprising a thin film for a transfer pattern, on a main surface of the reticle substrate according to claim 1.

3. The mask blank according to claim 2, wherein the thin film has a film stress of 0.5 Gpa or less.

4. The mask blank according to claim 2 or 3, wherein the flatness is 0.5 μm on a flatness measurement area of the main surface on which the thin film is formed, with an area of 3mm which is laid inwardly from the boundary between the main surface and the chamfered surface exempted from the flatness measurement area, while the boundary between the main surface and the chamfered surface has the maximum height between -1 and 0 μm from the reference surface.

5. A method for manufacturing the reticle substrate according to claim 1, characterized by the steps of:

grinding and precisely polishing a main surface of a reticle substrate; thereafter measuring a surface configuration of the main surface on an area that includes a substrate peripheral portion supported by a substrate-holding member of an exposure apparatus; and

modifying the surface configuration of the main surface on the basis of a result of the measurement so that the surface configuration of the main surface becomes a desired shape, by finding that an area of the main surface is convex relative to an optionally determined reference plane, by providing, on the area, a pressure higher than the other areas onto polishing pads of a polishing apparatus, with a polishing liquid being supplied towards the polishing pads, and by moving the reticle substrate relative to the polishing pads.

6. The method for manufacturing the reticle substrate according to claim 5, wherein the above-mentioned precisely polishing step comprises:

a roughly polishing process of removing surface defects of the substrate while maintaining the flatness obtained in the grinding process by using a relatively large abrasive grain; and

a mirror-polishing process of polishing the surface of the substrate for mirror finish by using a relatively small abrasive grain.

7. A method for manufacturing the mask blank by forming a thin film as a transfer pattern on a main surface of the reticle substrate manufactured by the method according to claim 5 or 6.

8. The method for manufacturing the mask blank according to claim 7, comprising:

a heating process of suppressing that change of the maximum height from the reference plane which appears during or after the forming of the thin film, at the boundary between the main surface and the chamfered surface, the heating process being carried out before and after the forming of the thin film.